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LIFTING PRODUCTION HEDGES:

A STRATEGY TO INCREASE HOG PRICES

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Hedging allows a farmer to gain some control over the price received in the market place. In fact, once a hedge is placed, the only unknown in determining the price received is the basis. The basis, which is the futures price at which the hedge is lifted minus the price received in the cash market, is generally smaller in absolute value and less variable than the cash price. Hence, the control gained over the price received.

Despite the relative smallness of its size, a farmer should strive to close out a hedge with as favorable a basis as possible. The price received for the hedged production is thereby maximized. Furthermore, depending on the relationship between the futures price at which the hedge was placed and the cost of production, a favorable basis may mean the difference between a profit and a loss.

This study analyzed a strategy for increasing the probability that a hedge on hog production is lifted at a favorable basis. Furthermore, the strategy is applicable to hedges on cattle and grain production.

A STRATEGY FOR LIFTING A HEDGE ON HOG PRODUCTION

The hedge lifting strategy analyzed was developed to answer the following question: should the hedge on hogs be lifted today or in one week's time. In other words, should the hogs be sold in the cash market the current day or one week hence. This decision is a common one for hog producers.

In making this decision the hog producer needs to know the cost of keeping the hogs for one more week. These costs include both production costs

and the possible price discount due to selling heavier hogs. The farmer also needs to form some idea of how prices will change. Since the production is hedged, this last consideration becomes one of formulating some idea of how the basis will change. While the current day's basis is known, the basis for next week will, of course, not be known for one more week. Thus, it is not possible to know the exact change in the basis. However, can the producer obtain an indication of the likely direction and magnitude of the change in the basis? This information, while not as valuable as knowing the exact change, would be useful in deciding whether to sell today or in one week.

Since the average of past basis observations for a day provides the best indication of what the basis will be for that day, a simple strategy for answering the above question would be to compare the current day's known basis with the average basis for the day one week hence. Therefore, if the current day's basis differs from the average basis one week hence, the actual basis in one week's time will probably be closer to the average basis for the day one week hence than is the current day's basis. For example, if the current day's basis is $6 and the average basis for the day one week hence is $2, the actual basis in one week will probably be closer to $2 than is the current day's basis of $6. Likewise, if the current day's basis is -$2 and next week's average basis is $2, the actual basis one week hence will probably be closer to $2 than is the current basis of -$2.

In addition to the above, the further the current day's basis is from the average basis for the day one week hence, the greater the chance that the actual basis in one week's time will be closer to the average basis. For example, if the average basis for the day one week hence is $2, the actual basis one week hence is more likely to decline towards $2 if the current day's

basis is $6 than if it is $4. Similarily, if the average basis for the day one week hence is $2, the actual basis in one week is more likely to increase towards $2 if the current day's basis is -$2 than if it is 0.

THE DATA

The data used to examine the strategy of comparing the current day's basis with the average basis one week hence were taken from the Ohio fed hog market over the period 1972-1982. The bases analyzed were calculated as the opening nearby futures price minus the high quote on the price range for U.S. number one and two barrows and gilts, 200-240 pounds at country points. The latter price is an average for 11 order buyers and packers scattered throughout Ohio and thus is a direct market cash price.

Cash prices were obtained only for Fridays. The Friday dates were grouped into weekly periods to estimate an average and standard deviation.[1/] These weekly periods were days 1-7, 8-14, 15-21, and 22-31 of a month. Thus, an average basis and its standard deviation were calculated for 48 weekly time periods. Lastly, the nearby futures contract was changed during the third weekly period of each contract's delivery month. At that time, the nearby contract became the futures contract next closest to the delivery month contract.

STRUCTURE OF THE INVESTIGATION

To investigate the above discussed strategy, the basis for each of the 48 weeks was broken into five categories by using the average and standard

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1/ Standard deviation is a measure of the variation in the past observations which are used to compute the average. That is, it reflects the closeness with which the past basis observations fall around their average. The greater the standard deviation, the greater the variation around the average.

deviation for the week. Given the five categories, the basis observed the current Friday were placed into one of next Friday's five categories as follows:[2/]

Category 1: The observed basis for the current Friday is greater than next Friday's average basis plus 1.5 times the standard deviation of next Friday's average basis.

Category 2: The observed basis for the current Friday is greater than next Friday's average basis plus 0.75 times the standard deviation of next Friday's basis but is less than next Friday's average basis plus 1.5 times the standard deviation of next Friday's average basis.

Category 3: The observed basis for the current Friday is within a range defined by next Friday's average basis plus or minus 0.75 times the standard deviation of next Friday's average basis.

Category 4: The observed basis for the current Friday is greater than next Friday's average basis minus 1.5 times the standard deviation of next Friday's average basis but is less than next Friday's average basis minus 0.75 times the standard deviation of next Friday's average basis.

Category 5: The observed basis for the current Friday is less than next Friday's average basis minus 1.5 times the standard deviation of next Friday's average basis.

Since the basis is defined as the futures price minus cash price, the first two categories represent observations in which the futures is substantially higher than usual against the cash. In contrast, categories four and five contain observations in which the cash is substantially higher than normal against the futures. Therefore, to maximize the price resulting from the production hedge, a producer would like to sell when the basis is in categories four and five and avoid selling when the basis is in categories one and two. If, as suggested above, the current Friday's basis being in categories

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2/ Investigations were also conducted using seven and nine categories. The results were similar to those obtained for the investigation based on five categories. Therefore, only the latter is reported.

four and five suggests that the actual basis next Friday will not be in categories four and five, the producer should consider selling the current Friday. By doing so, a higher price would likely be obtained for the hedged production. Furthermore, since category five is further from the average than category four, the current Friday's basis being in category five should provide a greater incentive to sell the current Friday than if the current Friday's basis is in category four. In contrast to the preceding, if the current Friday's basis being in categories one and two suggests that the actual basis next Friday will not be in categories one and two, the producer should consider selling next Friday. By doing so, the producer is likely to receive a higher price for the hedged production. In addition, since category one is further from the average than category two, the current Friday's basis being in category one should provide a greater incentive to sell next Friday than if the current Friday's basis is in category two.

The above verbal discussion was examined statistically by comparing the current Friday's basis with next Friday's actual basis. Direction and magnitude of the change in the basis was recorded. The observations were then grouped by the category in which the current Friday's basis was observed. For each of the five categories, the proportion of increases and decreases were computed as was the average change in the basis.

Two investigations were conducted. One covered the period 1972-1980 and used the averages and standard deviations calculated for this time period. The second covered 1981 and 1982 and used the averages and standard deviations calculated for 1972-1980. The latter investigation more nearly resembles the "real world." That is, a producer uses past and present information to decide present and future marketing actions.

RESULTS OF THE INVESTIGATION FOR 1972-1980

Examination of Table 1 reveals that categories one and five had the fewest number of observations while category three had the largest number. This result was expected since observations generally become fewer as the distance from the average increases. Nevertheless, 19 percent of the observations fell in the two extreme categories.

The data presented in Table 1 support the suggested strategy of comparing the current Friday's basis with next Friday's average basis. As expected, the percent of increases (decreases) increased (decreased) uniformly as observations moved from category one to five. Therefore, the direction of change in the basis was most predictable for observations falling in categories one and five. Also, as expected the amount of change was largest for the extreme categories (one and five) and smallest for the category closest to the average (three).

The average size of the decline in the basis for category one was $1.83/cwt. Thus, by waiting to sell until next Friday when the current Friday's basis was in category one, a hedger would have increased on average the price received by $1.83/cwt. In contrast, the size of the increase in the basis for category five was $1.67/cwt. Thus, if the producer had waited to sell until next Friday when the current Friday's basis was in category five, the price received from the hedge would have been $1.67 less on average. As a summary, over all 432 observations the strategy of selling the current Friday when its basis was in categories four and five and selling next Friday when the current Friday's basis was in categories one and two would have increased the price received from hedging by $.56/cwt on average.

Table 1: Distribution of Friday-to-Friday Changes and Average Change in Nearby Futures - Cash Basis, Ohio Direct Hog Market, 1972-1980

ITEM (based on Friday-to-Friday change)	BASIS CATEGORIES[a]				
	Category 1	Category 2	Category 3	Category 4	Category 5
Percent of Total Observations[b]	7	18	45	18	12
Percent of Increases in Basis[c]	6	31	58	65	100
Percent of Declines in Basis[c]	94	68	41	31	0
Average Change in Basis[d]	-1.83	.73	.13	.58	1.67

a/ For a description and discussion of the categories, see the text.

b/ The 432 total observations are divided among the categories as follows: Category 1, 32; Category 2, 78; Category 3, 193; Category 4, 78 and Category 5, 51.

c/ The percent of increases plus the percent of decreases may not add to 100 because for some observations the basis did not change from one Friday to the next.

d/ Dollars per hundredweight.

Sources: Chicago Mercantile Exchange Yearbook, 1971/72-1980.
Ohio Federal-State Newsletter, 1972-1980.

RESULTS OF THE INVESTIGATION FOR 1981 AND 1982

The years 1981-2 should prove a difficult test for the strategy. First, substantial cutbacks were being made in the U.S. pork herd. Second, Ohio hog numbers on average declined less than national hog numbers. Third, a hot summer in 1980, a mild winter in 1981, and a mild summer in 1982 caused unusual marketing patterns. In other words, pigs moved to market later or earlier than normal.

The above factors argue for an Ohio cash price that generally is lower than usual relative to the futures (a relatively larger Ohio than national supply, larger supplies in the short run compared with the long run due to the contraction in hog supplies, and a squeezing of supplies due to abnormal timings of marketings). Thus, substantially more observations than normal should fall in basis categories one and two. This expectation was confirmed (Table 2). Categories one and two contained 50 percent of the 96 observations. In contrast, categories four and five contained only four percent of the observations.

Given the preceding arguments, it is not surprising that the percent of observations in categories one and two for which the basis declined was smaller in 1981 and 1982 than during the 1972-1980 period. Nevertheless, over all 96 observations, on average the strategy discussed above would have increased the price received from hedging by $.44/cwt. This increase was less than in the 1972-80 period; however, even for two years in which substantial changes occurred in the normal market relationships, the strategy did increase the price received from a hedge.

Table 2: Distribution of Friday-to-Friday Changes and Average Change in Nearby Futures - Cash Basis, Ohio Direct Hog Market, 1981 and 1982

ITEM (based on Friday-to-Friday change)	BASIS CATEGORIES[a/]				
	Category 1	Category 2	Category 3	Category 4	Category 5
Percent of Total Observations[b/]	29	21	45	3	1
Percent of Increases in Basis[c/]	21	33	70	100	100
Percent of Declines in Basis[c/]	75	57	28	0	0
Average Change in Basis[d/]	-.73	-.54	.49	1.23	2.82

a/ For a description and discussion of the categories, see the text.

b/ The 96 total observations are divided among the categories as follows: Category 1, 28; Category 2, 21; Category 3, 43; Category 4, 3; and Category 5, 1.

c/ The percent of increases plus the percent of decreases may not sum to 100 because for some observations the basis did not change from one Friday to the next.

d/ Dollars per hundredweight.

Sources: Chicago Mercantile Exchange Yearbook, 1981.
Ohio Federal-State Newsletter, 1981 and 1982.
The Wall Street Journal, January 1982 - December 1982.

CONCLUSIONS AND LIMITATIONS

The above results demonstrate the importance of comparing the current day's basis with next week's average basis. Not taking this comparison into account could result in lower profits through the untimely lifting of the production hedge. But just because the current day's basis falls in category five, the hedge should not necessarily be lifted the current day. Likewise, just because the current day's basis falls in category one, the hedge should not be kept for one more week. As mentioned above, this decision must also take into account the cost of keeping the hogs for one more week. However, the results do indicate that the potential basis change from the current day to next week should be an important consideration in lifting a hedge. The strategy discussed above is a tool for taking advantage of these potential changes.

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